DUAL EXHAUST PIPE JOINT

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Inventor: IWATA MINORU
Applicant: TOYOTA MOTOR CORP
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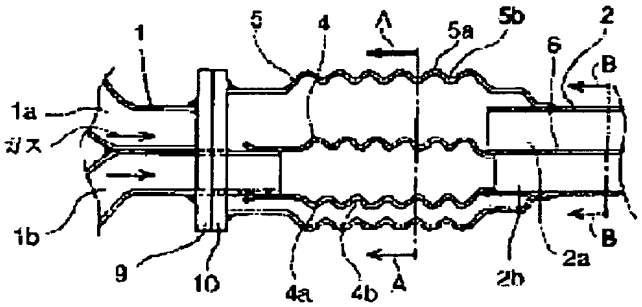
Abstract of **JP11257070**

PROBLEM TO BE SOLVED: To prevent communicating leakage of exhaust gas and absorb thermal expansion of the exhaust pipe from the exhaust gas.

SOLUTION: The joint consists of: an outer bellows pipe 5 having mountainous portions 5a and valley portions 5b which connects an upstream exhaust pipe 1 in which the inner portion is divided into a first upstream exhaust passage 1a and a second upstream exhaust passage 1b with a downstream exhaust pipe 2 in which the inner portion is divided into a first downstream exhaust passage 2a and a second downstream exhaust passage 2b; and an inner bellows pipe 4 located inside the outer bellows pipe 5, having extruding portions 4a and inverted portions 4b which connects one end of the first upstream exhaust passage 1a and the second upstream exhaust passage 1b of the inner portion of the upstream exhaust pipe 1 with one end of the first downstream exhaust passage 2a and second downstream passage 2b of the inner portion of the downstream exhaust pipe 2.



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(71)出願人　000003207
トヨタ自動車株式会社
愛知県豊田市トヨタ町１番地

(72)発明者　岩田　実
愛知県豊田市トヨタ町１番地　トヨタ自動車株式会社内

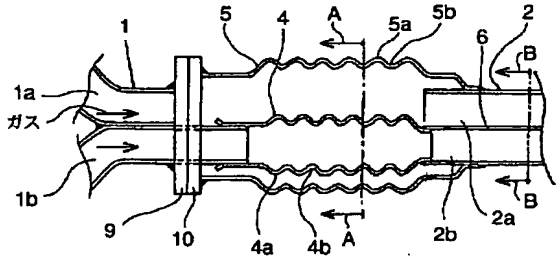
(74)代理人　弁理士　田渕　経雄

(54)【発明の名称】　デュアル排気管用ジョイント

(57)【要約】

【課題】　排気ガスの連通洩れを防止し、かつ排気ガスによる排気管の熱膨張を吸収することができるデュアル排気管用ジョイントの提供。

【解決手段】　第１の上流排気通路１ａと第２の上流排気通路１ｂに内部が分かれている上流排気管１と、第１の下流排気通路２ａと第２の下流排気通路２ｂに内部が分かれている下流排気管２を接続する、山部５ａと谷部５ｂとを備える蛇腹状の外ベローズ管５と、外ベローズ管５の内側に配置され、上流排気管１の内部の第１の上流排気通路１ａと第２の上流排気通路１ｂの一方と、下流排気管２の内部の第１の下流排気通路２ａと第２の下流排気通路２ｂの一方とを接続する、山部４ａと谷部４ｂとを備える蛇腹状の内ベローズ管４と、からなるデュアル排気管用ジョイント。



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【特許請求の範囲】

【請求項１】　第１の上流排気通路と第２の上流排気通路に内部が分かれている上流排気管と、第１の下流排気通路と第２の下流排気通路に内部が分かれている下流排気管を接続する、山部と谷部とを備える蛇腹状の外ベローズ管と、

該外ベローズ管の内側に配置され、前記上流排気管の内部の第１の上流排気通路と第２の上流排気通路の一方と、前記下流排気管の内部の第１の下流排気通路と第２の下流排気通路の一方とを接続する、山部と谷部とを備える蛇腹状の内ベローズ管と、からなるデュアル排気管用ジョイント。

【請求項２】　前記内ベローズ管は前記外ベローズ管に対して平行に配置されている、請求項１記載のデュアル排気管用ジョイント。

【請求項３】　前記内ベローズ管は前記外ベローズ管に対して交わる方向に配置されている、請求項１記載のデュアル排気管用ジョイント。

【請求項４】　前記外ベローズ管の蛇腹がらせん状に形成され、

前記内ベローズ管の蛇腹がらせん状に形成され、

外ベローズ管の軸中心に直交する線に対して傾斜した線上に外ベローズ管の蛇腹の山部と内ベローズ管の蛇腹の谷部が位置する、請求項２記載のデュアル排気管用ジョイント。

【請求項５】　前記内ベローズ管の外ベローズ管の中心側寄りが中心側でない部分に対して厚肉とされている、請求項２記載のデュアル排気管用ジョイント。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は、デュアル排気管用ジョイントに関する。

【０００２】

【従来の技術】エンジンの各シリンダから順に排出される排気ガスは、１つの通路内に排出されると排気脈動干渉が生じて排出されにくくなるので、２通路に分けられた、断面θ状のθ型排気管（デュアル排気管）内に排気脈動干渉を生じないように排出される。そのため、エンジン出力の低下を招くことが防止される（デュアル効果）。θ型排気管とθ型排気管が接続される場合、従来たとえば、トヨタ技術公開集（発行番号６３８６、発行日１９９６年１０月３１日）に開示されているように、あるいは図９に示すように、上流側θ型排気管２０の中間壁２１の下流側端をＹ字状にし、下流側θ型排気管３０の中間壁３１をＹ字状部分に挿入することが開示されている。上流側θ型排気管２０の中間壁２１のＹ字状の下流端と下流側θ型排気管３０の中間壁３１の間には隙間Ｓがあり、この隙間Ｓによって熱膨張などの中間壁２１、３１の動きを吸収できる。

【０００３】

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【発明が解決しようとする課題】しかし、従来の構造では隙間Ｓを通じて排気ガスの連通洩れが生じるおそれがある。それにより、たとえば、下流側θ型排気管３０の一方の通路３０ａ内へ上流側θ型排気管２０内の両方の通路２０ａ、２０ｂから排出された排気ガスが入り、デュアル効果が損なわれることになる。本発明の第１の目的は、エンジンから排気系への振動伝達遮断機能を有する、いわゆる排気管用ジョイントにおいて、排気ガスの連通洩れを防止し、かつ排気ガスによる排気管の熱膨張を吸収することができるデュアル排気管用ジョイントを提供することにある。本発明の第２の目的は、上記第１の目的に加え、内ベローズ管の耐熱の信頼性が向上した排気管用ジョイントを提供することにある。

【０００４】

【課題を解決するための手段】上記目的を達成する本発明はつぎの通りである。

（１）　第１の上流排気通路と第２の上流排気通路に内部が分かれている上流排気管と、第１の下流排気通路と第２の下流排気通路に内部が分かれている下流排気管を接続する、山部と谷部とを備える蛇腹状の外ベローズ管と、該外ベローズ管の内側に配置され、前記上流排気管の内部の第１の上流排気通路と第２の上流排気通路の一方と、前記下流排気管の内部の第１の下流排気通路と第２の下流排気通路の一方とを接続する、山部と谷部とを備える蛇腹状の内ベローズ管と、からなるデュアル排気管用ジョイント。

（２）　前記内ベローズ管は前記外ベローズ管に対して平行に配置されている、（１）記載のデュアル排気管用ジョイント。

（３）　前記内ベローズ管は前記外ベローズ管に対して交わる方向に配置されている、（１）記載のデュアル排気管用ジョイント。

（４）　前記外ベローズ管の蛇腹がらせん状に形成され、前記内ベローズ管の蛇腹がらせん状に形成され、外ベローズ管の軸中心に直交する線に対して傾斜した線上に外ベローズ管の蛇腹の山部と内ベローズ管の蛇腹の谷部が位置する、（２）記載のデュアル排気管用ジョイント。

（５）　前記内ベローズ管の、外ベローズ管の中心側寄りが中心側でない部分に対して厚肉とされている（２）記載のデュアル排気管用ジョイント。

【０００５】（１）～（５）のデュアル排気管用ジョイントでは、外ベローズ管が上流排気管と下流排気管を接続し、外ベローズ管の内側に配置された内ベローズ管が上流排気管内の第１の上流排気通路と第２の上流排気通路の一方と、下流排気管内の第１の下流排気通路と第２の下流排気通路の一方を接続しているので、上流排気管内の第１の上流排気通路と第２の下流排気通路の他方から流れ出る排気ガスは内ベローズ管と外ベローズ管の間を通り下流排気管内の第１の下流排気通路と第２の下流

排気通路の他方のみに入り他の通路内に入ることがなく、上流排気管内の第１の上流排気通路と第２の上流排気通路の一方から流れ出る排気ガスは内ベローズ管内を通り下流排気管内の第１の下流排気通路と第２の下流排気通路の一方のみに入り他の通路内に入ることがなく、排気の連通洩れが生じることがない。また、蛇腹状の外ベローズ管と内ベローズ管によって上流排気管と下流排気管の熱膨張を吸収できる。（３）のデュアル排気管用ジョイントでは、上流排気管内の第１の上流排気通路と第２の上流排気通路の一方と下流排気管内の第１の下流排気通路と第２の下流排気通路の一方とを接続する内ベローズ管が外ベローズ管に対して交わる方向に配置されるので、上流排気管内の第１の上流排気通路と第２の上流排気通路の他方から出て下流排気管内の第１の下流排気通路と第２の下流排気通路の他方に向かう排気ガスは外ベローズ管と内ローズ管の間を内ベローズ管の周囲に回り込みながら流れる。そのため、内ベローズ管の特定部分が排気ガスに多くさらされることによる、特定部分の温度上昇が抑制され、内ベローズ管の耐熱の信頼性が向上する。（４）のデュアル排気管用ジョイントでは、外ベローズ管と外ベローズ管に対して平行に配置された内ベローズ管の蛇腹がらせん状とされ、外ベローズ管の軸中心に直交する線に対して傾斜した線状に外ベローズ管の山部と内ベローズ管の蛇腹の谷部が位置しているので、外ベローズ管と内ベローズ管の間を流れる排気ガスはらせんを描いて流れやすくなり、内ベローズ管の外側全体に回り込みやすくなる。そのため、内ベローズ管の特定部分が排気ガスに多くさらされることによる、特定部分の温度上昇が抑制され、内ベローズ管の耐熱の信頼性が向上する。（５）のデュアル排気管用ジョイントでは、外ベローズ管に対して平行に配置された内ベローズ管の外ベローズ管の中心側寄りは中心側でない部分より排気ガスに多くさらされるが、中心側でない部分に対して厚肉とされているので耐熱の信頼性が向上されている。

【０００６】

【発明の実施の形態】図１は全実施例に共通する排気管の概略を示しており、図２～図４は本発明の第１実施例を示しており、図５は本発明の第２実施例を示しており、図６、図７は本発明の第３実施例を示しており、図８は本発明の第４実施例を示している。本発明の全実施例にわたって共通する構造を持つ部分には、全実施例にわたって同じ符号を付してある。

【０００７】本発明の全実施例に共通するデュアル排気管用ジョイントを、図１～図４を参照して、説明する。本発明の全実施例では、図１、図２に示すように、下流端部が断面θ状のθ型排気管で、第１の上流排気通路１ａと第２の上流排気通路１ｂ（以下、上流排気通路１ａ、１ｂ）の２通路に内部が分割されているエキゾーストマニホールド１（上流排気管）と、内部中央に中間壁６が設けられた断面θ状のθ型排気管で、第１の下流排気通路２ａと第２の下流排気通路２ｂ（以下、下流排気通路２ａ、２ｂ）の２通路に内部が分割されているθ型フロントパイプ（下流排気管）２（図４）との間に、デュアル（θ型）排気管用ジョイント３が用いられる場合を例にとっている。デュアル排気管用ジョイント３はほかの部分にも用いることができ、たとえばθ型フロントパイプ同士の接続に用いることができる。図１では、エキゾーストマニホールドは上流端が、４気筒エンジンに取り付けられる場合を示しているが、４気筒以外の多気筒エンジンに適用してもよい。たとえば、①～④の順に並んでいる４気筒において、エンジンの点火順序が気筒番号①、③、④、②の順であり、気筒①、②、③、④にブランチ１Ａ、１Ｂ、１Ｃ、１Ｄが接続されている場合は、エキゾーストマニホールド１の下流端部でブランチ１Ａと１Ｄが、１Ｂと１Ｃが連通して２通路となる。

【０００８】本発明の全実施例に共通するデュアル排気管用ジョイント３は、外ベローズ管５と外ベローズ管５の内部に配置された内ベローズ管４とを有し、２重管構造となっている。

【０００９】外ベローズ管５は、半径方向外側に突出した山部５ａと、山部５ａと山部５ａとの間の谷部５ｂとを備え、エキゾーストマニホールド１の下流端部とθ型フロントパイプ２とを接続する。断面形状は楕円、円など任意形状でよく、搭載性、加工性などを考慮して決められる。

【００１０】外ベローズ管５とエキゾーストマニホールド１とは、たとえば、外ベローズ管５の上流側端に溶接接合された第２の組み付けフランジ１０と、エキゾーストマニホールド１の下流端部に溶接接合された第１の組み付けフランジ９とがボルト結合され、接続される。外ベローズ管５とエキゾーストマニホールド１とが接続されているとき、エキゾーストマニホールド１内の上流排気通路１ａ、１ｂの一方は第２の組み付けフランジ１０内を貫通し、外ベロース管５内まで延びている。

【００１１】外ベローズ管５とθ型フロントパイプ２とは、たとえば、外ベローズ管５の下流側にθ型フロントパイプ２が挿入され、θ型フロントパイプ２の外周面に外ベローズ管５の下端が溶接接合され、接続される。

【００１２】内ベローズ管４は、図３に示すように、外ベローズ管５の内側に配置される。半径方向外側に突出した山部４ａと、山部４ａと山部４ａとの間の谷部４ｂとを備え、エキゾーストマニホールド１内の上流排気通路１ａ、１ｂの一方と、θ型フロントパイプ２内の下流排気通路２ａ、２ｂの一方とを接続する。断面形状は楕円、円など任意形状でよく、搭載性、加工性などを考慮して決められる。

【００１３】内ベローズ管４と上流排気通路１ａ、１ｂの一方とは、たとえば、外ベローズ管５内まで延びている上流排気通路１ａ、１ｂの一方が内ベローズ管４に嵌

合され、接続される。なお、内ベローズ管４の上流端は第２の組み付けフランジ１０に接合されてもよい。

【００１４】内ベローズ管４と下流排気通路２ａ、２ｂの一方とは、たとえば、θ型フロントパイプ２内の下流排気通路２ａ、２ｂの一方に内ベローズ管４が挿入され、内ベローズ管４の下流側外周面にθ型フロントパイプ２内の下流排気通路２ａ、２ｂの一方の入口端が溶接接合され、接続される。

【００１５】上記構造の作用を説明する。本発明実施例では、エキゾーストマニホールド１とθ型フロントパイプ２との間にデュアル排気管用ジョイント３が配置され、エキゾーストマニホールド１とθ型フロントパイプ２とが外ベローズ管５によって接続され、エキゾーストマニホールド１内の上流排気通路１ａ、１ｂの一方とθ型フロントパイプ２内の下流排気通路２ａ、２ｂの一方とが内ベローズ管４によって接続されているので、上流排気通路１ａ、１ｂの他方から出る排気ガスは外ベローズ管５と内ベローズ管４の間（内ベローズ管４の径方向外側でかつ外ベローズ管５の径方向内側）を流れ、下流排気通路２ａ、２ｂの他方にのみ入る。エキゾーストマニホールド１内の上流排気通路１ａ、１ｂの一方から出る排気ガスは内ベローズ管４内を流れ、下流排気通路２ａ、２ｂの一方にのみ入る。したがって、上流排気通路１ａ、１ｂの他方から出る排気ガスが下流排気通路２ａ、２ｂの一方に入ったり、上流排気通路１ａ、１ｂの一方から出る排気ガスが下流排気通路２ａ、２ｂの他方に入るなどの連通洩れは生じなく、排気脈動干渉が生じることを防ぐ。そのため、エンジン出力の低下が生じない。また、外ベローズ管５と内ベローズ管４は蛇腹状であり、排気ガスの熱によるエキゾーストマニホールド１やθ型フロントパイプ２の熱膨張を吸収できる。

【００１６】つぎに、本発明の各実施例に特有な部分を説明する。本発明の第１実施例では、図２に示すように、内ベローズ管４によって接続される上流排気通路１ｂと下流排気通路２ｂは間隔を隔てて対向した位置にあり、内ベローズ管４は外ベローズ管５に対して平行に配置されている。上記構造の作用については、上流排気通路１ａから流れ出た排気ガスは外ベローズ管５と内ベローズ管４との間のみを流れ下流排気通路２ａに入る。上流排気通路１ｂから流れ出た排気ガスは内ベローズ管４内のみを流れ下流排気通路２ｂに入る。

【００１７】本発明の第２実施例では、図５に示すように、内ベローズ管４によって、下側の上流排気通路１ｂと上流排気通路１ｂと対向しない位置にある上側の下流排気通路２ａとが接続され、内ベローズ管４は外ベローズ管５に対して交わる方向に配置されている。上記構造の作用については、上流排気通路１ａから出る排気ガスは外ベローズ管５と内ベローズ管４の間を下流排気通路２ｂに向かって、内ベローズ管４の周囲を回り込むようにして流れる。第１実施例の場合、外ベローズ管５と内ベローズ管４の間を流れる排気ガスと内ベローズ管４内を流れる排気ガスにより、内ベローズ管４の外ベローズ管５の中心側寄りの温度が他の部分より上昇しやすいが、本発明の第２実施例では排気ガスが内ベローズ管４の周囲に回り込んで流れるので、内ベローズ管の温度上昇の偏りが抑制され、内ベローズ管４の耐熱の信頼性が向上する。

【００１８】本発明の第３実施例では、第１実施例に示すように、外ベローズ管５と内ベローズ管４は平行に配置され、さらに図６に示すように、外ベローズ管５の蛇腹と内ベローズ管４の蛇腹がらせん状に形成され、外ベローズ管５の軸中心に直交する線に対して所定の角度で傾斜した複数の線Ｌ上に外ベローズ管５の蛇腹の山部５ａと内ベローズ管４の蛇腹の谷部４ｂが位置している。上記構造の作用については、外ベローズ管５と内ベローズ管４によって形成されるらせん溝に沿って流れるガス流成分が生じるので（図７参照）外ベローズ管５と内ベローズ管４の間を流れる排気ガスが内ベローズ管４の周囲に回り込みやすくなる。そのため、内ベローズ管４の温度の偏りが抑制され、内ベローズ管４の耐熱の信頼性は向上する。

【００１９】本発明の第４実施例では、第１実施例に示すように、内ベローズ管４は外ベローズ管５に対して平行に配置され、さらに図８に示すように、内ベローズ管４の外ベローズ管５の中心側寄りが中心側でない部分に対して厚肉とされている。上記構造の作用については、外ベローズ管５と内ベローズ管４とが平行に配置され、上流排気通路１ａから出る排気ガスは外ベローズ管５と内ベローズ管４の間を下流排気通路２ａに向かって流れる。そのため、内ベローズ管の外ベローズ管の中心側寄りは中心側寄りでない部分に比べて排気ガスに多くさらされる。しかし、内ベローズ管４の外ベローズ管５の中心側寄りは中心側でない部分に対して厚肉とされているので、内ベローズ管４の耐熱の信頼性が向上する。

【００２０】

【発明の効果】請求項１～請求項５のデュアル排気管のジョイント構造によれば、上流排気管の第１の上流排気通路と第２の上流排気通路の他方から流れ出る排気ガスは外ベローズ管と内ベローズ管の間を通り下流排気管の第１の下流排気通路と第２の下流排気通路の他方に達し、上流排気管の第１の上流排気通路と第２の排気通路の他方から流れ出る排気ガスは内ベローズ管内を通り下流排気管の第１の下流排気通路と第２の下流排気通路の他方に達するので、連通洩れが生じることがない。また、外ベローズ管と内ベローズ管が蛇腹状であるので、上流排気管と下流排気管の熱膨張を吸収できる。請求項３のデュアル排気管のジョイント構造によれば、内ベローズ管は外ベローズ管に対して交わる方向に配置されているので、内ベローズ管の周囲に排気ガスが回り込みやすくなり、内ベローズ管の温度上昇の偏りを抑えること

ができ、内ベローズ管の耐熱の信頼性が向上する。請求項４のデュアル排気管のジョイント構造によれば、外ベローズ管と内ベローズ管によって形成されるらせん溝に沿って排気ガスが流れるので、内ベローズ管の周囲に排気ガスが回り込みやすくなり、内ベローズ管の温度上昇の偏りを抑えることができ、内ベローズ管の耐熱の信頼性が向上する。請求項５のデュアル排気管のジョイント構造によれば、内ベローズ管の中央寄り側が厚肉とされているので、内ベローズ管の耐熱の信頼性が向上する。

【図面の簡単な説明】

【図１】全実施例に共通する排気管全体の概略図である。

【図２】本発明の第１実施例のデュアル排気管用ジョイントの断面図である。

【図３】図２のＡ－Ａ線断面図である。

【図４】図２のＢ－Ｂ線断面図である。

【図５】本発明の第２実施例のデュアル排気管用ジョイントの断面図である。

＊【図６】本発明の第３実施例のデュアル排気管用ジョイントの断面図である。

【図７】図６のＣ－Ｃ線断面図である。

【図８】本発明の第４実施例のデュアル排気管用ジョイントの断面図である。

【図９】従来のデュアル排気管の接続部分の断面図である。

【符号の説明】

１　エキーゾーストマニホールド（上流排気管）

１ａ　第１の上流排気通路

１ｂ　第２の上流排気通路

２　θ型フロントパイプ（下流排気管）

２ａ　第１の下流排気通路

２ｂ　第２の下流排気通路

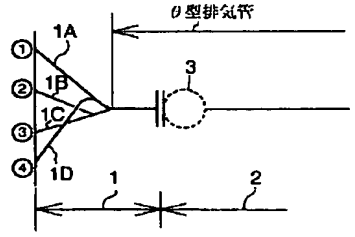
３　デュアル排気管用ジョイント

４　内ベローズ管

５　外ベローズ管

＊

【図１】



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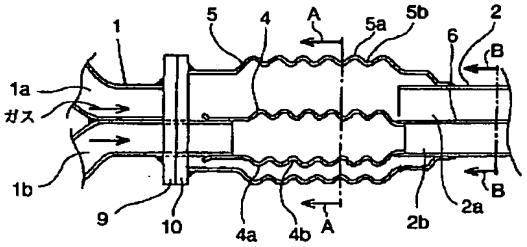

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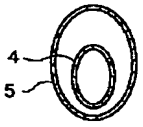

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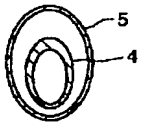

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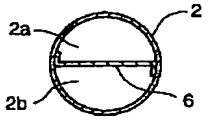

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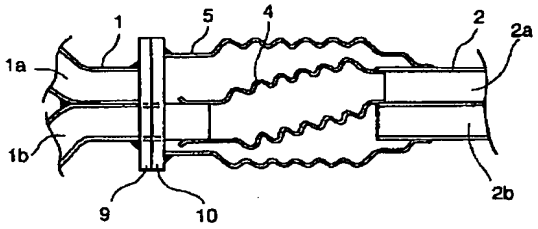

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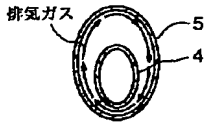

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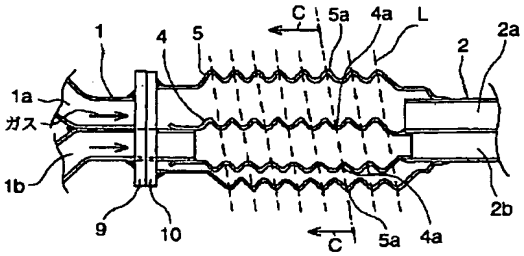
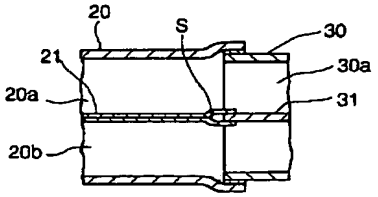


【図９】



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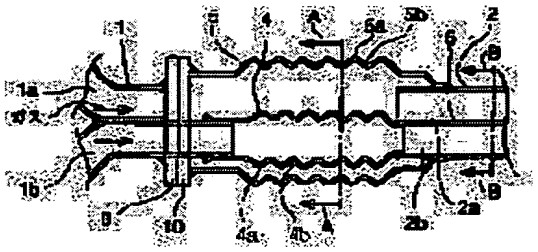
(71)Applicant : TOYOTA MOTOR CORP
(72)Inventor : IWATA MINORU

(54) DUAL EXHAUST PIPE JOINT

(57)Abstract:
PROBLEM TO BE SOLVED: To prevent communicating leakage of exhaust gas and absorb thermal expansion of the exhaust pipe from the exhaust gas.
SOLUTION: The joint consists of: an outer bellows pipe 5 having mountainous portions 5a and valley portions 5b which connects an upstream exhaust pipe 1 in which the inner portion is divided into a first upstream exhaust passage 1a and a second upstream exhaust passage 1b with a downstream exhaust pipe 2 in which the inner portion is divided into a first downstream exhaust passage 2a and a second downstream exhaust passage 2b; and an inner bellows pipe 4 located inside the outer bellows pipe 5, having extruding portions 4a and inverted portions 4b which connects one end of the first upstream exhaust passage 1a and the second upstream exhaust passage 1b of the inner portion of the upstream exhaust pipe 1 with one end of the first downstream exhaust passage 2a and second downstream passage 2b of the inner portion of the downstream exhaust pipe 2.



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CLAIMS

[Claim(s)]
[Claim 1] The upper exhaust pipe with which the interior is divided into the 1st upper flueway and the 2nd upper flueway, Bellows tubing outside the shape of bellows equipped with Yamabe and a trough which connects the down-stream exhaust pipe with which the interior is divided into the 1st down-stream flueway and the 2nd down-stream flueway, It is arranged inside bellows tubing outside this. One side of the 1st upper flueway inside said upper exhaust pipe, and the 2nd upper flueway, inner bellows tubing of the shape of bellows equipped with Yamabe and a trough which connects one side of the 1st down-stream flueway inside said down-stream exhaust pipe, and the 2nd down-stream flueway -- since -- the becoming joint for dual exhaust pipes.
[Claim 2] Said inner bellows tubing is joint for dual exhaust pipes according to claim 1 arranged in parallel to said outside bellows tubing.
[Claim 3] Said inner bellows tubing is joint for dual exhaust pipes according to claim 1 arranged in the direction at which it crosses to said outside bellows tubing.
[Claim 4] Joint for dual exhaust pipes according to claim 2 with which the bellows of said outside bellows tubing is formed spirally, the bellows of said inner bellows tubing is spirally formed, and Yamabe of the bellows of outside bellows tubing and the trough of the bellows of inner bellows tubing are located on the line which inclined to the line which intersects perpendicularly with the shaft center of outside bellows tubing.
[Claim 5] Joint for dual exhaust pipes according to claim 2 with which core side approach of bellows tubing is made heavy-gage to the part which is not a core side outside said inner bellows tubing.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the joint for dual exhaust pipes.
[0002]
[Description of the Prior Art] Since it will become that exhaust air pulsating interference arises

and it is hard to be discharged [redacted] scharged in one path, the exhaust gas [redacted] harged sequentially from each engine cylinder is discharged so that exhaust air pulsating interference may not be produced in theta mold exhaust pipe (dual exhaust pipe) of the shape of cross-section theta divided into two paths. Therefore, causing the fall of engine power is prevented (dual effectiveness). When theta mold exhaust pipe and theta mold exhaust pipe are connected, as indicated by the conventional, for example, Toyota, technical public presentation collection (the issue number 6386, date-of-issue October 31, 1996), or as shown in drawing 9 , the downstream edge of the middle wall 21 of the upstream theta mold exhaust pipe 20 is made into the shape of Y character, and inserting the middle wall 31 of the downstream theta mold exhaust pipe 30 in a Y character-like part is indicated. Clearance S is between the down-stream edge of the shape of Y character of the middle wall 21 of the upstream theta mold exhaust pipe 20, and the middle wall 31 of the downstream theta mold exhaust pipe 30, and a motion of the middle walls 21 and 31, such as thermal expansion, can be absorbed by this clearance S.

[0003]

[Problem(s) to be Solved by the Invention] However, with the conventional structure, there is a possibility that the omission in a free passage of exhaust gas may arise through Clearance S. The exhaust gas discharged from the paths 20a and 20b of both in the upstream theta mold exhaust pipe 20 will enter by that cause into one path 30a of the downstream theta mold exhaust pipe 30, and dual effectiveness will be spoiled. The 1st purpose of this invention is to offer the joint for dual exhaust pipes which has an oscillating transfer cutoff function from an engine to an exhaust air system and which can prevent the omission in a free passage of exhaust gas, and can absorb the thermal expansion of the exhaust pipe by exhaust gas in the so-called joint for exhaust pipes. The 2nd purpose of this invention is to offer the joint for exhaust pipes whose heat-resistant dependability of inner bellows tubing improved in addition to the 1st purpose of the above.

[0004]

[Means for Solving the Problem] This invention which attains the above-mentioned purpose is as follows.

(1) The upper exhaust pipe with which the interior is divided into the 1st upper flueway and the 2nd upper flueway, Bellows tubing outside the shape of bellows equipped with Yamabe and a trough which connects the down-stream exhaust pipe with which the interior is divided into the 1st down-stream flueway and the 2nd down-stream flueway, It is arranged inside bellows tubing outside this. One side of the 1st upper flueway inside said upper exhaust pipe, and the 2nd upper flueway, inner bellows tubing of the shape of bellows equipped with Yamabe and a trough which connects one side of the 1st down-stream flueway inside said down-stream exhaust pipe, and the 2nd down-stream flueway -- since -- the becoming joint for dual exhaust pipes.

(2) Said inner bellows tubing is joint for dual exhaust pipes given in (1) arranged in parallel to said outside bellows tubing.

(3) Said inner bellows tubing is joint for dual exhaust pipes given in (1) arranged in the direction at which it crosses to said outside bellows tubing.

(4) said -- outside -- bellows -- tubing -- bellows -- spiral -- forming -- having -- said -- inner

-- bellows -- tubing -- bellow[redacted]spiral -- forming -- having -- outside [redacted]ellows -- tubing -- a shaft center -- intersecting perpendicularly -- a line -- receiving -- having inclined -- a line -- a top -- outside -- bellows -- tubing -- bellows -- Yamabe -- inner -- bellows -- tubing -- bellows -- a trough -- being located -- (-- two --) -- a publication -- dual -- an exhaust pipe -- ** -- joint .

(5) Joint for dual exhaust pipes given in (2) with which core side approach of bellows tubing is made heavy-gage outside said inner bellows tubing to the part which is not a core side.

[0005] (1) at the joint for dual exhaust pipes of - (5) Inner bellows tubing which outside bellows tubing connected the upper exhaust pipe and the down-stream exhaust pipe, and has been arranged inside outside bellows tubing One side of the 1st upper flueway in an upper exhaust pipe, and the 2nd upper flueway, Since one side of the 1st down-stream flueway in a down-stream exhaust pipe and the 2nd down-stream flueway is connected The exhaust gas which flows out of another side of the 1st upper flueway in an upper exhaust pipe and the 2nd down-stream flueway goes only into another side of the 1st down-stream flueway in a down-stream exhaust pipe, and the 2nd down-stream flueway through between inner bellows tubing and outside bellows tubing, and it does not enter in other paths. The exhaust gas which flows out of one side of the 1st upper flueway in an upper exhaust pipe and the 2nd upper flueway goes only into one side of the 1st down-stream flueway in a down-stream exhaust pipe, and the 2nd down-stream flueway through the inside of inner bellows tubing, and does not enter in other paths, and the omission in a free passage of exhaust air does not produce it. Moreover, the thermal expansion of an upper exhaust pipe and a down-stream exhaust pipe is absorbable with bellows tubing and inner bellows tubing bellows-like outside. Since it is arranged in the direction in which inner bellows tubing which connects one side of one side of the 1st upper flueway in an upper exhaust pipe and the 2nd upper flueway, the 1st down-stream flueway in a down-stream exhaust pipe, and the 2nd down-stream flueway crosses at the joint for dual exhaust pipes of (3) to outside bellows tubing The exhaust gas which comes out from another side of the 1st upper flueway in an upper exhaust pipe and the 2nd upper flueway, and goes to another side of the 1st down-stream flueway in a down-stream exhaust pipe and the 2nd down-stream flueway flows between outside bellows tubing and inner Lowe's tubing with a surroundings lump around inner bellows tubing. Therefore, the temperature rise of a particular part by many pans to exhaust gas of the particular part of inner bellows tubing being carried out is controlled, and the heat-resistant dependability of inner bellows tubing improves. At the joint for dual exhaust pipes of (4), it is supposed that the bellows of inner bellows tubing arranged in parallel to outside bellows tubing and outside bellows tubing is spiral. Since Yamabe of outside bellows tubing and the trough of the bellows of inner bellows tubing are located in the line which inclined to the line which intersects perpendicularly with the shaft center of outside bellows tubing, the exhaust gas which flows between outside bellows tubing and inner bellows tubing draws a whorl, and becomes easy to flow, and it surroundings-lump-comes to be easy of exhaust gas on the whole outside of inner bellows tubing. Therefore, the temperature rise of a particular part by many pans to exhaust gas of the particular part of inner bellows tubing being carried out is controlled, and the heat-resistant dependability of

inner bellows tubing improves. [redacted] ough more pans to exhaust gas of the [redacted] e side approach of bellows tubing than the part which is not a core side are carried out at the joint for dual exhaust pipes of (5) outside inner bellows tubing arranged in parallel to outside bellows tubing, to the part which is not a core side since it is heavy-gage, heat-resistant dependability is improving.

[0006]

[Embodiment of the Invention] Drawing 1 shows the outline of the exhaust pipe common to all examples, drawing 2 - drawing 4 show the 1st example of this invention, drawing 5 shows the 2nd example of this invention, drawing 6 and drawing 7 show the 3rd example of this invention, and drawing 8 R> 8 shows the 4th example of this invention. The same sign is given to the part with the structure which is common covering all the examples of this invention covering all examples.

[0007] The joint for dual exhaust pipes common to all the examples of this invention is explained with reference to drawing 1 - drawing 4 . As shown in drawing 1 and drawing 2 , a down-stream edge in all the examples of this invention with cross-section theta-like theta mold exhaust pipe 1st upper flueway 1a and the exhaust manifold 1 (upper exhaust pipe) by which the interior is divided into two paths of 2nd upper flueway 1b (henceforth, upstream flueways 1a and 1b), With cross-section theta-like theta mold exhaust pipe with which the middle wall 6 was established in the center of the interior, 1st down-stream flueway 2a and 2nd down-stream flueway 2b The case where the joint 3 for dual (theta mold) exhaust pipes is used between theta mold front pipes (down-stream exhaust pipe) 2 (drawing 4) with which the interior is divided into two paths of (following and down-stream flueway 2a, 2b) is taken for the example. The joint 3 for dual exhaust pipes can be used for other parts, for example, can be used for connection of theta mold front pipes. In drawing 1 , an exhaust manifold may be applied to multiple cylinder engines other than a 4-cylinder, although the upper edge shows the case where it is attached in a 4-cylinder engine. For example, in the 4-cylinder located in a line in order of ** - **, engine firing order is the order of gas column number **, **, **, and **, when Branches 1A, 1B, 1C, and 1D are connected to gas column **, **, **, and **, at the down-stream edge of an exhaust manifold 1, 1B and 1C are open for free passage, and Branches 1A and 1D become two paths.

[0008] The joint 3 for dual exhaust pipes common to all the examples of this invention has the outside bellows tubing 5 and the inner bellows tubing 4 arranged inside the outside bellows tubing 5, and has double tubing structure.

[0009] The outside bellows tubing 5 is equipped with trough 5b between Yamabe 5a projected on the radial outside, and Yamabe 5a and Yamabe 5a, and connects the down-stream edge of an exhaust manifold 1, and theta mold front pipe 2. An arbitration configuration is sufficient as an ellipse, a circle, etc., and a cross-section configuration is decided in consideration of loading nature, workability, etc.

[0010] Bolt association of the 2nd attachment flange 10 by which weldbonding was carried out, and the 1st attachment flange 9 by which weldbonding was carried out to the down-stream edge of an exhaust manifold 1 is carried out, and the outside bellows tubing 5 and an exhaust manifold 1 are connected to the upstream edge of the outside bellows tubing 5. When the outside bellows tubing 5 and an exhaust manifold 1 are connected, one side of the upper flueways 1a and 1b in an

exhaust manifold 1 penetrated inside of the 2nd attachment flange 10 is prolonged in the outside BEROSU tubing 5.

[0011] theta mold front pipe 2 is inserted in the downstream of the outside bellows tubing 5, weldbonding of the lower limit of the outside bellows tubing 5 is carried out to the peripheral face of theta mold front pipe 2, and the outside bellows tubing 5 and theta mold front pipe 2 are connected to it.

[0012] The inner bellows tubing 4 is arranged inside the outside bellows tubing 5, as shown in drawing 3 . It has trough 4b between Yamabe 4a projected on the radial outside, and Yamabe 4a and Yamabe 4a, and one side of the upper flueways 1a and 1b in an exhaust manifold 1 and one side of down-stream flueway 2a in theta mold front pipe 2 and 2b are connected. An arbitration configuration is sufficient as an ellipse, a circle, etc., and a cross-section configuration is decided in consideration of loading nature, workability, etc.

[0013] Fitting of one side of the upper flueways 1a and 1b which have extended in the outside bellows tubing 5 is carried out to the inner bellows tubing 4, and the inner bellows tubing 4 and one side of the upper flueways 1a and 1b are connected. In addition, the upper edge of the inner bellows tubing 4 may be joined to the 2nd attachment flange 10.

[0014] The inner bellows tubing 4 is inserted in one side of down-stream flueway 2a in theta mold front pipe 2, and 2b, weldbonding of one inlet-port edge of down-stream flueway 2a in theta mold front pipe 2 and 2b is carried out to the downstream peripheral face of the inner bellows tubing 4, and, as for the inner bellows tubing 4 and one side of down-stream flueway 2a and 2b, it is connected to it.

[0015] An operation of the above-mentioned structure is explained. In this invention example, the joint 3 for dual exhaust pipes is arranged between an exhaust manifold 1 and theta mold front pipe 2. An exhaust manifold 1 and theta mold front pipe 2 are connected by the outside bellows tubing 5. Since one side of the upper flueways 1a and 1b in an exhaust manifold 1 and one side of down-stream flueway 2a in theta mold front pipe 2 and 2b are connected by the inner bellows tubing 4 The exhaust gas which comes out from another side of the upper flueways 1a and 1b flows between the outside bellows tubing 5 and the inner bellows tubing 4 (the direction outside of a path of the inner bellows tubing 4 and the direction inside of a path of the outside bellows tubing 5), and goes only into another side of down-stream flueway 2a and 2b. The exhaust gas which comes out of one side of the upper flueways 1a and 1b in an exhaust manifold 1 flows the inside of the inner bellows tubing 4, and goes only into one side of down-stream flueway 2a and 2b. Therefore, it prevents the exhaust gas which comes out from another side of the upper flueways 1a and 1b not going into one side of down-stream flueway 2a and 2b, or not producing the omission in a free passage of the exhaust gas which comes out of one side of the upper flueways 1a and 1b going into another side of down-stream flueway 2a and 2b etc., and exhaust air pulsating interference arising. Therefore, the fall of engine power does not arise. Moreover, the outside bellows tubing 5 and the inner bellows tubing 4 are bellows-like, and can absorb the thermal expansion of the exhaust manifold 1 by the heat of exhaust gas, or theta mold front pipe 2.

[0016] Below, a part peculiar to the 1st example of this invention is explained. In the 1st example of this invention, as shown in drawing 2 , upper flueway 1b and down-stream flueway 2b which are connected by the inner bellows tubing 4 are in the location which separated spacing and countered, and the inner bellows tubing 4 is arranged in parallel to the outside bellows tubing 5. About an operation of the above-mentioned structure, the exhaust gas which flowed out of upper flueway 1a flows between the outside bellows tubing 5 and the inner bellows tubing 4, and goes into down-stream flueway 2a. The exhaust gas which flowed out of upper flueway 1b flows only the inside of the inner bellows tubing 4, and goes into down-stream flueway 2b.

[0017] In the 2nd example of this invention, as shown in drawing 5 , lower upper flueway 1b, upper flueway 1b, and down-stream flueway 2a of the top in the location which does not counter are connected by the inner bellows tubing 4, and the inner bellows tubing 4 is arranged in the direction at which it crosses to the outside bellows tubing 5. About an operation of the above-mentioned structure, the exhaust gas which comes out of upper flueway 1a turns between the outside bellows tubing 5 and the inner bellows tubing 4 around the inner bellows tubing 4 toward down-stream flueway 2b, and as it is crowded, it flows. In the case of the 1st example, with the exhaust gas which flows between the outside bellows tubing 5 and the inner bellows tubing 4, and the exhaust gas which flows the inside of the inner bellows tubing 4 Although the temperature of the core side approach of the bellows tubing 5 tends to rise from other parts outside the inner bellows tubing 4, since exhaust gas turns to the perimeter of the inner bellows tubing 4 and flows in the 2nd example of this invention, the bias of the temperature rise of inner bellows tubing is controlled, and the heat-resistant dependability of the inner bellows tubing 4 improves.

[0018] As are shown in the 1st example, and the outside bellows tubing 5 and the inner bellows tubing 4 are arranged in parallel and are further shown in drawing 6 in the 3rd example of this invention The bellows of the outside bellows tubing 5 and the bellows of the inner bellows tubing 4 are formed spirally, and Yamabe 5a of the bellows of the outside bellows tubing 5 and trough 4b of the bellows of the inner bellows tubing 4 are located on two or more lines L which inclined at an angle of predetermined to the line which intersects perpendicularly with the shaft center of the outside bellows tubing 5. About an operation of the above-mentioned structure, since the gas stream component which flows along with the spiral sulcus formed with the outside bellows tubing 5 and the inner bellows tubing 4 arises (refer to drawing 7), the flowing exhaust gas surroundings-lump-comes to be easy of between the outside bellows tubing 5 and the inner bellows tubing 4 around the inner bellows tubing 4. Therefore, the bias of the temperature of the inner bellows tubing 4 is controlled, and the heat-resistant dependability of the inner bellows tubing 4 improves.

[0019] In the 4th example of this invention, as are shown in the 1st example, and the inner bellows tubing 4 is arranged in parallel to the outside bellows tubing 5 and is further shown in drawing 8 , core side approach of the bellows tubing 5 is made heavy-gage to the part which is not a core side outside the inner bellows tubing 4. About an operation of the above-mentioned structure, the outside bellows tubing 5 and the inner bellows tubing 4 are arranged in parallel, and the exhaust gas which comes out of upper flueway 1a flows between the outside bellows tubing 5 and the

inner bellows tubing 4 toward [redacted]-stream flueway 2a. Therefore, compa[redacted]with the part which is not core side slippage, many pans to exhaust gas of the core side approach of bellows tubing are carried out outside inner bellows tubing. However, outside the inner bellows tubing 4, since core side approach of the bellows tubing 5 is made heavy-gage to the part which is not a core side, its heat-resistant dependability of the inner bellows tubing 4 improves.

[0020]

[Effect of the Invention] According to the joint structure of the dual exhaust pipe of claim 1 - claim 5, the exhaust gas which flows out of another side of the 1st upper flueway of an upper exhaust pipe and the 2nd upper flueway arrives at another side of the 1st down-stream flueway of a down-stream exhaust pipe, and the 2nd down-stream flueway through between outside bellows tubing and inner bellows tubing. Since the exhaust gas which flows out of another side of the 1st upper flueway of an upper exhaust pipe and the 2nd flueway arrives at another side of the 1st down-stream flueway of a down-stream exhaust pipe, and the 2nd down-stream flueway through the inside of inner bellows tubing, the omission in a free passage does not produce it. Moreover, since outside bellows tubing and inner bellows tubing are bellows-like, the thermal expansion of an upper exhaust pipe and a down-stream exhaust pipe is absorbable. According to the joint structure of the dual exhaust pipe of claim 3, since inner bellows tubing is arranged in the direction at which it crosses to outside bellows tubing, exhaust gas surroundings-lump-comes to be easy of tubing around inner bellows tubing, it can suppress the bias of the temperature rise of inner bellows tubing, and its heat-resistant dependability of inner bellows tubing improves. Since exhaust gas flows along with the spiral sulcus formed with outside bellows tubing and inner bellows tubing according to the joint structure of the dual exhaust pipe of claim 4, exhaust gas surroundings-lump-comes to be easy around inner bellows tubing, the bias of the temperature rise of inner bellows tubing can be suppressed, and the heat-resistant dependability of inner bellows tubing improves. According to the joint structure of the dual exhaust pipe of claim 5, since the central approach side of inner bellows tubing is made heavy-gage, the heat-resistant dependability of inner bellows tubing improves.

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] It is the schematic diagram of the whole exhaust pipe common to all examples.

[Drawing 2] It is the sectional view of the joint for dual exhaust pipes of the 1st example of this invention.

[Drawing 3] It is the A-A line sectional view of drawing 2 .

[Drawing 4] It is the B-B line sectional view of drawing 2 .

[Drawing 5] It is the sectional view of the joint for dual exhaust pipes of the 2nd example of this invention.

[Drawing 6] It is the sectional view of the joint for dual exhaust pipes of the 3rd example of this invention.

[Drawing 7] It is the C-C line [redacted]onal view of drawing 6 .

[Drawing 8] It is the sectional view of the joint for dual exhaust pipes of the 4th example of this invention.

[Drawing 9] It is the sectional view of the connection part of the conventional dual exhaust pipe.

[Description of Notations]

1 EKIZOSUTOMANIHORUDO (Upper Exhaust Pipe)

1a The 1st upper flueway

1b The 2nd upper flueway

2 Theta Mold Front Pipe (Down-stream Exhaust Pipe)

2a The 1st down-stream flueway

2b The 2nd down-stream flueway

3 Joint for Dual Exhaust Pipes

4 Inner Bellows Tubing

5 Outside Bellows Tubing